

### **IN THE CLAIMS**

Please amend the claims as follows:

1-24. (Cancelled)

25. (Currently Amended) An electro-optic modulator comprising:  
a waveguide;  
an optical resonant cavity optically coupled to the waveguide;  
a p+ doped area formed on a first side of the optical resonant cavity; and  
an n+ doped area formed on a second side of the optical resonant cavity such that the optical resonant cavity forms an intrinsic, non-active region of a P-I-N diode.

26. (Original) The electro-optic modulator of claim 25 wherein carriers are injected into the optical resonant cavity by applying a voltage across the p+ and n+ doped areas to change the resonant frequency of the optical resonant cavity.

27. (Original) The electro-optic modulator of claim 25 wherein the n+ and p+ areas are electrically isolated.

28. (Original) The electro-optic modulator of claim 27 and further comprising lateral trenches formed adjacent the n+ and p+ areas.

29. (Original) The electro-optic modulator of claim 27 wherein the n+ and p+ areas are formed on an insulator.

30. (Original) The electro-optic modulator of claim 25 wherein the optical resonant cavity comprises orthogonal trenches formed at both ends of the optical resonant cavity to reflect light back into the optical resonant cavity.

31. (Original) The electro-optic modulator of claim 25 wherein the injection of carriers into the optical resonant cavity by applying a voltage across the p+ and n+ doped areas changes the concentration of free carriers in the optical resonant cavity.
32. (Original) The electro-optic modulator of claim 31 wherein the concentration of free carriers in the optical resonant cavity is changed without significant heating of the cavity.
33. (Original) The electro-optic modulator of claim 25 wherein optical resonant cavity comprises a planar micro cavity.
34. (Original) The electro-optic modulator of claim 33 wherein the planar micro cavity comprises a rib waveguide.
35. (Original) The electro-optic modulator of claim 34 wherein the optical resonant cavity comprises a distributed Bragg reflector formed at both ends of the rib waveguide.
36. (Currently Amended) An electro-optic modulator comprising:  
an optical resonator cavity having free carriers; and  
means for controlling the concentration of free carriers in the optical resonator cavity to vary the refractive index of the optical resonator cavity.
37. (Original) The electro-optic modulator of claim 36 wherein the means for controlling the concentration of free carriers in the optical resonator cavity comprises a p+ doped area and a n+ doped area on opposite sides of the optical resonator cavity such that a p-i-n diode is formed with the optical resonator cavity comprising the intrinsic region of the p-i-n diode.
38. (Original) The electro-optic modulator of claim 37 wherein carriers are injected into the optical resonator cavity by applying a voltage across the p+ and n+ doped areas changes the resonant frequency of the optical resonator cavity.

39. (Original) The electro-optic modulator of claim 37 wherein the n<sup>+</sup> and p<sup>+</sup> areas are electrically isolated.
40. (Original) The electro-optic modulator of claim 39 and further comprising lateral trenches formed adjacent the n<sup>+</sup> and p<sup>+</sup> areas.
41. (Original) The electro-optic modulator of claim 39 wherein the n<sup>+</sup> and p<sup>+</sup> areas are formed on an insulator.
42. (Original) The electro-optic modulator of claim 36 wherein the optical resonator cavity further comprises orthogonal trenches formed at both ends of the optical resonator cavity to reflect light back into the optical resonator cavity.
43. (Original) The electro-optic modulator of claim 36 wherein the injection of carriers into the optical resonator cavity by applying a voltage across the p<sup>+</sup> and n<sup>+</sup> doped areas changes the concentration of free carriers in the optical resonator cavity.
44. (Original) The electro-optic modulator of claim 43 wherein the concentration of free carriers in the optical resonator cavity is changed without significant heating of the cavity.
45. (Original) The electro-optic modulator of claim 37 wherein optical resonator cavity comprises a planar micro cavity.
46. (Original) The electro-optic modulator of claim 45 wherein the planar micro cavity comprises a rib waveguide.
47. (Original) The electro-optic modulator of claim 46 wherein the optical resonator cavity comprises a distributed Bragg reflector formed at both ends of the rib waveguide.
48. (Currently Amended) An electro-optic modulator comprising:

a waveguide;

an optical resonant cavity having a rib waveguide formed of silicon on insulator optically coupled to the waveguide and formed with a pair of optical reflectors coupled to each end of the rib waveguide;

a p+ doped area formed on a first side of the rib waveguide; and

an n+ doped area formed on a second side of the rib waveguide such that the rib waveguide forms [[an]]a non-active “i” portion of a P-I-N diode adapted to modulate carrier concentration within the optical resonant cavity to modulate light within the optical resonant cavity.